


EPA United States Environmental Protection Agency Washington, DC 20460 Work Assignment		Work Assignment Number 2-15	
		<input type="checkbox"/> Other <input type="checkbox"/> Amendment Number:	
Contract Number EP-C-12-060		Contract Period 09/30/2012 To 09/29/2015 Base Option Period Number 2	
Contractor TETRA TECH, INC.		Title of Work Assignment/SF Site Name Phase 2 Synthesis and Assessme	
Purpose: <input checked="" type="checkbox"/> Work Assignment <input type="checkbox"/> Work Assignment Close-Out <input type="checkbox"/> Work Assignment Amendment <input type="checkbox"/> Incremental Funding <input type="checkbox"/> Work Plan Approval		Period of Performance From 09/30/2014 To 09/29/2015	
Comments:			
<input type="checkbox"/> Superfund Accounting and Appropriations Data <input checked="" type="checkbox"/> Non-Superfund			
Note: To report additional accounting and appropriations data use EPA Form 1900-69A.			
SFO (Max 2) <input type="checkbox"/>			
Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)
1			
2			
3			
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5			
Authorized Work Assignment Ceiling			
Contract Period: 09/30/2012 To 09/29/2015 Cost/Fee: LOE:			
This Action:			
Total:			
Work Plan / Cost Estimate Approvals			
Contractor WP Dated:		Cost/Fee: LOE:	
Cumulative Approved:		Cost/Fee: LOE:	
Work Assignment Manager Name Thomas Johnson _____ (Signature) (Date)		Branch/Mail Code: Phone Number 703-347-8618 FAX Number:	
Project Officer Name Sharon Boyde _____ (Signature) (Date)		Branch/Mail Code: Phone Number: 703-347-8576 FAX Number: 703-374-8696	
Other Agency Official Name _____ (Signature) (Date)		Branch/Mail Code: Phone Number: FAX Number:	
Contracting Official Name Mark Cranley  09/16/14 (Signature) (Date)		Branch/Mail Code: CAPD Phone Number: 513-487-2351 FAX Number: 513-487-2109	

**Performance Work Statement
Tetra Tech, Inc.
Contract EP-C-12-060
Work Assignment No. 2-15**

I. Title: Phase 2 Synthesis and Assessment of Climate Change Effects on Water Quality and Aquatic Ecosystems

II. Period of Performance: Award through September 29, 2015

III. Work Assignment Manager:

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V. Introduction:

The EPA Office of Research and Development (ORD) Global Change Assessment Staff (GCAS) works to build the capacity of EPA program and regional offices, water managers, and other decision-makers to assess and respond to global change impacts on water quality and aquatic ecosystems. Research and assessment activities in the GCAS Water Quality focus area broadly support EPA's mission and responsibilities as defined by the Clean Water Act and the Safe Drinking Water Act.

Climate is a key driver of watershed hydrologic and biogeochemical processes that determine water quality and aquatic ecosystem condition. During the last century, much of the U.S. experienced climate change including warming temperatures, increases in precipitation, and increases in the intensity of precipitation events. Changes in climate and hydrology can have direct and indirect effects on water quality. Climate change will also interact with human use and demand for water, water- management infrastructure, and other stressors resulting in multiple, cascading, and cumulative effects on water

quality and aquatic ecosystems. In many areas, climate change will present an increased risk of water quality impairment and inability to meet water quality regulatory requirements.

A relatively large body of literature exists addressing the potential effects of climate change on water quantity. Less is known about the potential effects of climate change on water quality. An improved understanding of the potential effects of climate change on water quality and aquatic ecosystems, key vulnerabilities, and adaptation options is critical to the long-term success of EPA's National Water Program.

This Work Assignment is for support developing a national-scale synthesis and assessment of climate change effects on water quality and aquatic ecosystems, with particular focus on relevance and implications for EPA's National Water Program. The assessment will be developed as a set of inter-related modules including Science Syntheses (draft topics listed below) and Program Link documents (draft topics identified below) embedded within an underlying, web-based organizational structure. Beyond summarizing the literature, the assessment will attempt to synthesize available information to draw conclusions that extend our understanding beyond that provided by individual products. The assessment will be co-developed with input from OW and the Regions and focus on relevance and implications for EPA's National Water Program (NWP). The assessment will also help to identify knowledge gaps and priority research needs necessary to advance the science in support of EPA adaptation and decision making.

VI. Specific Tasks and Deliverables:

Task 1 – Prepare Workplan, Establish Communication, and Prepare QAPP

SubTask 1.1. Prepare Work Plan and Cost Estimate

The Contractor shall prepare a work plan in response to this work assignment, outlining the proposed approach, expertise and staffing, and resources needed, and a schedule to complete each task. The work plan should identify potential data and tools needed and any potential problems that might be encountered during the execution of the work assignment.

SubTask 1.2. Establish communication with the COR and develop a regular reporting schedule

The Contractor shall contact the COR and schedule a kickoff project meeting. In collaboration with the COR the Contractor shall also establish a schedule for regular progress reports, project meetings, and other communications throughout the period of performance of this Work Assignment.

Deliverable 1.2.A: Brief, written progress reports as email to the COR. Due monthly or upon request by the COR for the duration of this Work Assignment.

Deliverable 1.2.B: Project meetings and other communications, such as conference calls, as needed. Due upon request by the COR for the duration of this Work Assignment.

SubTask 1.3. Develop a QAPP

All work conducted under this Work Assignment shall be performed pursuant to an EPA approved Quality Assurance Project Plan (QAPP). The contractor shall develop a Quality Assurance Project Plan within 30 days after project start for review and approval by the TOM and the EPA QA Officer. The QAPP can be based directly on the previously approved QAPP developed for WA 1-15 in Option Year 1. The QAPP shall outline the approach and measures the Contractor will implement to ensure a high standard of quality in data analysis and written deliverables. The QAPP shall be in conformance with EPA's *Requirements for Quality Assurance Project Plans* (EPA QA/R-5). Portions of this Work Assignment relevant to modeling will reference *Guidance for Quality Assurance Project Plans for Modeling* (EPA QA/G-5M), while portions of this Work Assignment relevant to geospatial data will reference *Guidance for Quality Assurance Project Plans for Geospatial Data* (EPA QA/G-5G). Elements from these sources will be used to derive a single QAPP for this Work Assignment.

Deliverable 1.3.A: QAPP for this WA. Due to the COR 2 weeks after award.

Task 2 – Conduct literature review, write 11 “Science Syntheses”, and provide electronic copies of each reference cited

EPA GCAS has developed a draft prospectus that provides an overview of the goal of the Assessment, general approach, discusses roles and responsibilities for authors, the review process, communication, and an overall timeline, as well as a draft outline for the Science Syntheses (see outline in Section XII). The Science Syntheses shall include a literature review, draft report, comments from the EPA, and response to comments through a final draft for each Science Synthesis topic. The Contractor shall conduct a thorough review of the peer reviewed scientific literature and shall include all relevant work published across EPA (particularly OW, the Regions, and ORD labs) and resulting from STAR grants addressing climate change and water quality or aquatic ecosystems to address each of the following topics:

1. Streamflow
2. Nutrients (e.g., Nitrogen, Phosphorus)
3. Water Temperature
4. Pathogens/HABs/Invasive Species
5. Biota/Ecological Condition
6. Sediments
7. Sea level rise and salinity
8. Adaptation for Infrastructure
9. Adaptation for Water Quality and Watershed Protection
10. Methods for Assessing Vulnerability, Impacts and Adaptation
11. Addressing Uncertainty through Scenario Analysis

The draft syntheses shall be written in a format to be specified by the COR (e.g., ready to be incorporated into the report structure), and be written in clear, concise prose consistent with the standards of peer reviewed scientific literature. The Contractor shall propose a schedule for completing draft and final versions of each Science Synthesis and submit to the COR for approval. For efficiency the literature review shall start with the most recent major reviews and syntheses in each topic areas (e.g.,

technical inputs to the National Climate Assessment, USGCRP Synthesis and Assessment Products). The Contractor shall then incorporate new, relevant literature, focusing on the period from roughly 2000 to present. The COR will provide a list of initial documents. The Contractor shall prepare a draft synthesis and submit to the COR for review. The Contractor shall revise the draft to address COR comments. Additional sources may be identified. A second and final draft shall be submitted to the COR for approval. Upon completion, the Contractor shall provide electronic copies of each reference cited in all of the Science Syntheses.

Deliverable 2.A: Proposed schedule for completing the 11 Science Syntheses for COR approval. Due 4 weeks after award.

Deliverable 2.B: First draft of the 11 Science Synthesis papers discussing the literature on each corresponding topic. Due to the COR as specified in Deliverable 2.A.

Deliverable 2.C: Final draft of the 11 Science Synthesis papers discussing the literature on each corresponding topic and addressing COR comments on Deliverable 2.A. Due to the COR as specified in Deliverable 2.A.

Deliverable 2.D: Electronic copies of each reference cited in all of the 11 Science Synthesis papers. Due to the COR after the 11 final draft Science Synthesis papers have been received by the COR.

Task 3 – Write “Program Link” documents

EPA and EPA partners have developed a draft list of 14 Program Link documents (See draft list of Program Links below). The Program Links shall be 2-3 page summaries that would link EPA program needs (largely drawn from the OW Strategy and OW/Regional Implementation Plans) to the relevant science information. It will be important that these are reviewed by OW and the Regions to ensure they faithfully capture OW and Regional needs for information. The Contractor shall develop the Program Link documents by working with the COR. The Program Link documents will include a first draft Program Link, comments from the EPA and EPA Partners, and response to comments through a final draft for each Program Link topic to complete the Program Link products.

The draft list of 14 Program Links is listed below:

Infrastructure:

1. Water/Energy/Mitigation Nexus for Water Infrastructure
2. Stormwater Management/CSOs
3. Water Quality Management Planning and Climate Change Adaptation
4. Drinking Water/ Source Water Quality
5. Wastewater treatment

Watersheds and Wetlands:

6. Wetlands/404/Compensatory Mitigation
7. Healthy Watersheds/Restoration

Coastal and Ocean Waters:

8. National Estuary Program

Protecting Water Quality:

9. State Monitoring Programs/
Bioassessments
10. NPDES Permitting
11. TMDLs
12. Altered Hydrology Impacts on Water
Quality Criteria and Standards
13. Green Infrastructure

Working with Tribes:

14. Vulnerable Populations and Tribes

The Program Links shall be written in a format to be specified by the COR (e.g., ready to be incorporated into the report structure), and written in clear, concise prose. The Contractor shall propose a schedule for completing first draft and final draft versions of each Program Link and submit to the COR for approval. The Contractor shall receive guidance from the COR on key program elements and associated climate sensitivities for each Program Link document based on COR meetings with EPA OW and Regions during Fall 2014. The Contractor shall develop a first draft for each Program Link topic and submit to the COR for review. The Contractor shall revise the draft to address COR comments. A final draft shall be submitted to the COR for approval.

Deliverable 3.A: Proposed schedule for completing the 14 Program Link documents for COR approval. Due 4 weeks after award.

Deliverable 3.B: First draft of the 14 Program Link documents discussing the link between the science and EPA programs for each Program Link topic. Due to the COR as specified in Deliverable 3.A.

Deliverable 3.C: Final draft of the 14 Program Link documents discussing the link between the science and EPA programs for each Program Link topic. Due to the COR as specified in Deliverable 3.A.

Task 4 – Support to design and evaluate the underlying web-based organizational structure and to develop plain language text

The WQA will be a web-based product with Science Syntheses and Program Link documents with plain language web text as an EPA website. This website will be set up and managed by the EPA. The contractor shall support the development of the webpages related to the WQA including web design and web text. The contractor shall help in the design of the basic layout of the website as requested by the COR. The contractor shall help develop web text as requested by the COR.

Navigating the WQA EPA website will require intuitive and transparent links that users can easily follow to the desired information. The EPA will work with EPA partners to test the usability of the web product including a day-long workshop to test usability. The Contractor shall help facilitate a day-long workshop to beta-test the usability of the WQA EPA website. It is anticipated that the meeting will be at EPA Potomac Yard in Crystal City, VA with a webinar link for outside participants. The Contractor shall attend

the workshop, take notes throughout the workshop, and provide a report on the proceedings of the workshop.

Deliverable 4.A: Write plain language web text for posting on the WQA EPA website. Due as agreed upon with the COR.

Deliverable 4.B. Notes from the beta-test day-long workshop. Due 2 weeks after the workshop.

Task 5 – General Support in Developing Presentation and Outreach Materials

The Contractor shall provide miscellaneous support to develop the WQA. The contractor shall develop general presentation material that can be used in briefings and presentations related to the WQA including conceptual models, graphics, and text. Throughout the course of developing the WQA, multiple briefings will be given to EPA OW and the Regions. EPA will take the lead in developing the presentation material and will give the briefings and presentations. The contractor shall support the COR as requested to develop, review, and comment on presentation materials.

Deliverable 5.A: Presentation materials as requested by the COR. Due as agreed upon with the COR.

VII. Schedule of Milestones and Deliverables:

Task No.	DELIVERABLE	Schedule
1	1.2.A. Progress reports	Due monthly
1	1.2.B. Other communication	Due upon request by the COR
1	1.3.A. Work Assignment QAPP	Due 2 weeks after award
2	2.A. Proposed schedule for drafting Science Synthesis papers	Due 4 weeks after award
2	2.B. First drafts of 11 synthesis papers	Due as specified in deliverable 2.A
2	2.C. Final drafts of 11 synthesis papers	Due as specified in deliverable 2.A
2	2.D. Electronic pdf copies of all cited literature	Due after completion of deliverable 2.C
3	3.A. Proposed schedule for drafting Program Link documents	Due 4 weeks after award
3	3.B. First drafts of 14 Program Link documents	Due as specified in deliverable 3.A
3	3.C. Final drafts of 14 Program Link documents	Due as specified in deliverable 3.A
4	4.A. Plain language web text	Due as agreed upon with the COR
4	4.B. Notes from beta testing WQA EPA website workshop	Due 2 weeks after workshop
5	5.A. Presentation materials	Due as agreed upon with the COR

VIII. Acceptance Criteria:

The Contractor shall prepare high quality deliverables. The Deliverables shall be edited for grammar, spelling, and logic flow. The technical information shall be reasonably complete and presented in a logical, readable manner. Figures submitted shall be of high quality similar to presentations developed for national scientific forums and should be formatted as jpeg or png files. Text deliverables shall be provided in Microsoft Word 2007 or compatible format.

IX. Conflict of Interest:

The Contractor warrants that, to the best of the Contractor's knowledge and belief, that there are no relevant facts or circumstances which could give rise to a conflict of interest, as defined in FAR subpart 9.5, or that the Contractor has disclosed all such relevant information.

The Contractor agrees to notify the Contracting Officer immediately, that to the best of its knowledge and belief, no actual or potential conflict of interest exists or to identify to the Contracting Officer any actual or potential conflict of interest the Contractor may have.

The Contractor agrees that if an actual or potential conflict of interest is identified during the performance, the Contractor shall immediately make a full disclosure in writing to the Contracting Officer. This disclosure shall include a description of actions which the Contractor has taken or proposes to take, after consulting with the Contracting Officer, to avoid, mitigate, or neutralize the actual or potential conflict of interest. The Contractor shall continue performance until notified by the Contracting Officer of any contrary action to be taken.

X. Management Controls:

1. The EPA will review and provide comments on the Work Plan and QAPP.
2. The EPA will also review and provide comments on subsequent deliverables.
3. The Contractor shall clearly identify itself as an EPA contractor when acting in fulfillment of this contract. No decision-making activities relating to Agency policy, enforcement or future contracting shall take place if the Contractor is present. If the Contractor has a need to meet with Federal employees on-site, then the Contractor personnel shall visibly wear identification in performance of this contract while on-site that will be issued by the Government upon arrival to the Federal facility.
4. Technical Direction: The COR is authorized to provide technical direction that clarifies the statement of work as set forth in this work assignment. Before initiating any action under technical direction, the contractor shall ensure that the technical direction falls within the scope of work for this work assignment. The technical direction shall be issued in writing by the COR within four working days of verbal issuance. This will be forwarded to the PO and CO for their information and necessary actions.

The COR is the only person authorized to make changes to this work assignment or contract. The changes must have prior approval from the COR in writing as an amendment or modification to the work assignment or contract.

Technical direction includes direction to the contractor that assists the contractor in accomplishing individual tasks deemed appropriate under the Statement of Work, as well as comments and approval of reports and other deliverables

XI. Notice Regarding Guidance Provided Under This Work Assignment:

Guidance by the Contractor is strictly limited to management and analytical support. The Contractor shall not engage in activities of an inherently governmental nature such as the following:

1. Formulation of Agency policy
2. Selection of Agency priorities
3. Development of Agency regulations

Should the Contractor receive any instruction from an EPA staff person that the Contractor ascertains to fall into any of these categories or goes beyond the scope of the contractor or work assignment, the Contractor shall immediately contact the Project Officer or the Contract Specialist.

The Contractor shall also ensure that work under this individual work assignment does not contain any apparent or real personal or organizational conflict of interest. The Contractor shall certify that none exists at the time the work plan is submitted to EPA.

XII. Draft Science Synthesis Outline

**This is the general format that, at least, the first 7 Science Syntheses will follow. Those syntheses are:

1. Nutrients (Nitrogen, Phosphorus)
2. Streamflow
3. Water Temperature
4. Pathogens/HABs/Invasive Species
5. Biota/Ecological Condition
6. Sediments
7. Sea level rise and salinity

The advantage of a consistent structure means the pieces or sections can easily become the consistent folder tabs on the website, like this screen shot from the Expo-Box website, that link to the respective web pages:

At the same time, you'd like these syntheses to be publishable reviews of the science in part or in toto. As I understood it (and this is a straw outline for editing), the sections were as follows

1. Introduction (introduces the stressor, its importance, and the layout of the document)
2. Overview of relevant EPA programs (discusses relevance of this synthesis to OW programs specifically)
3. Current conditions (describes the current known distributions of this stressor – extents, magnitudes, waterbodies affected, etc.) and management (describes current management approaches for reducing stressors)
 - a. Current conditions/stressor distributions
 - i. Extent
 - ii. Magnitude/Duration/Frequency
 - iii. Transport Pathways
 - iv. Impacts
 - v. Waterbodies Affected
 - b. Current management
 - i. Programmatic efforts to reduce stressors
 - ii. "Tools" from BMPs
 - iii. Effectiveness-maybe sensitivity to climate
4. Sensitivity to Climate Variability (discusses what is known about how current stressor dynamics (extent, magnitude, etc) are influenced by climate drivers (flow, temperature)-system behavior, what we know)
5. Vulnerability to Climate Variability (essentially discusses "exposure" from the risk assessment framework, discusses drivers of vulnerability, and includes regional differences; also includes underlying factors (e.g. aging infrastructure, that affect "exposure" risk)- linking sensitivity to exposure; climate is not the only stressor (e.g., land use change, water drawdown)
 - a. Describe how exposure pathways (from source to receptor contact) may be affected by climate drivers
 - i. Build on sensitivities described in 4
 - ii. How might these drivers affect exposure pathways (increase/decrease sources, facilitate/interfere with transport, decrease/amplify contact)
 - iii. Leads into 6
6. Impacts (Meat of this synthesis. This section addresses what we know about how climate change scenarios will influence extent, magnitude, frequency, and duration of this stressor in the future, how it differs among regions, how it may differ by waterbodies, and how it might interact with other stressors.)
 - a. Extent

- b. Magnitude/Duration/Frequency
 - c. Waterbody Specific Differences (could also weave into sub-sections above)
 - d. Regional differences (Ditto)
 - e. Interactions with other stressors
- 7. Management and Adaptation (Highlight EPA work)
 - a. Research into tools/strategies to adapt to predicted impacts
 - b. Links to policy/adaptation strategies/frameworks from regions/OW
 - c. Links to adaptation syntheses-improvements to BMP
- 8. Summary/Conclusions (Will cover what we know about sensitivity/vulnerability, impacts, research needs/gaps, and policy links for a science audience)
 - a. Sensitivity/Vulnerability
 - b. Impacts
 - c. Research Needs/Gaps
 - d. Policy Links

EPAUnited States Environmental Protection Agency
Washington, DC 20460**Work Assignment**

Work Assignment Number

2-15

☐ Other ☐ Amendment Number:Contract Number
EP-C-12-060

Contract Period 09/30/2012 To 09/29/2015

Title of Work Assignment/SF Site Name

Base Option Period Number 2

Phase 2 Synthesis/Assessment

Contractor
TETRA TECH, INC.

Specify Section and paragraph of Contract SOW

Purpose:



Work Assignment



Work Assignment Close-Out



Work Assignment Amendment



Incremental Funding



Work Plan Approval

Period of Performance

From 09/30/2014 To 09/29/2015

Comments:



Superfund

Accounting and Appropriations Data



Non-Superfund

SFO
(Max 2)

Note: To report additional accounting and appropriations data use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 09/30/2012 To 09/29/2015 Cost/Fee: \$0.00 LOE: 0

This Action: \$259,784.00 2,450

Total: \$259,784.00 2,450

Work Plan / Cost Estimate Approvals

Contractor WP Dated: 10/15/2014 Cost/Fee: \$259,784.00 LOE: 2,450

Cumulative Approved: Cost/Fee: \$259,784.00 LOE: 2,450

Work Assignment Manager Name Thomas Johnson

Branch/Mail Code:

Phone Number 703-347-8618

FAX Number:

(Signature)

(Date)

Project Officer Name Sharon Boyde

Branch/Mail Code:

Phone Number: 703-347-8576

FAX Number: 703-374-8696

(Signature)

(Date)

Other Agency Official Name

Branch/Mail Code:

Phone Number:

FAX Number:

(Signature)

(Date)

Contracting Official Name Mark Cranley

Branch/Mail Code: CPOD

Phone Number: 513-487-2351

FAX Number: 513-487-2109

(Signature)

(Date)

EPAUnited States Environmental Protection Agency
Washington, DC 20460**Work Assignment**

Work Assignment Number

2-15

☐ Other ☒ Amendment Number:

000001

Contract Number
EP-C-12-060

Contract Period 09/30/2012 To 09/29/2015

Title of Work Assignment/SF Site Name

Base Option Period Number 2

Climate Change Effects

Contractor

TETRA TECH, INC.

Specify Section and paragraph of Contract SOW

2e

Purpose:

☐

Work Assignment

☐

Work Assignment Close-Out

☒

Work Assignment Amendment

☐

Incremental Funding

☐

Work Plan Approval

Period of Performance

From 09/30/2014 To 09/29/2015

Comments:

☐ Superfund

Accounting and Appropriations Data

☒ Non-SuperfundSFO
(Max 2)☐

Note: To report additional accounting and appropriations data use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period:

Cost/Fee:

LOE:

09/30/2012 To 09/29/2015

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated:

Cost/Fee:

LOE:

Cumulative Approved:

Cost/Fee:

LOE:

Work Assignment Manager Name Thomas Johnson

Branch/Mail Code:

Phone Number 703-347-8618

FAX Number:

(Signature)

(Date)

Project Officer Name Sharon Boyde

Branch/Mail Code:

Phone Number: 703-347-8576

FAX Number: 703-374-8696

(Signature)

(Date)

Other Agency Official Name

Branch/Mail Code:

Phone Number:

FAX Number:

(Signature)

(Date)

Contracting Official Name Mark Cranley

Branch/Mail Code: CP00

Phone Number: 513-487-2351

FAX Number: 513-487-2109

(Signature)

(Date)

**Performance Work Statement
Tetra Tech, Inc.
Contract EP-C-12-060
Work Assignment 2-15
Amendment 1**

I. Phase 2 Synthesis and Assessment of Climate Change Effects on Water Quality and Aquatic Ecosystems

II. Period of Performance: Award through September 29, 2015

III. Work Assignment Manager:

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IV. Total Estimated LOE: 924 hours

V. Tasks and Deliverables:

Task M-1. Additional analysis and increased scope and level of detail of “Science Syntheses” #8-11

Under WA 2-15, Task 2 (existing), the Contractor will write and deliver to the COR 11 “Science Syntheses” documents on the following topics:

1. Streamflow
2. Nutrients (e.g., Nitrogen, Phosphorus)
3. Water Temperature
4. Pathogens/HABs/Invasive Species

5. Biota/Ecological Condition
6. Sediments
7. Sea level rise and salinity
8. Adaptation for Infrastructure
9. Adaptation for Water Quality and Watershed Protection
10. Methods for Assessing Vulnerability, Impacts and Adaptation
11. Addressing Uncertainty through Scenario Analysis

A draft outline for Science Syntheses documents was included in WA 2-15. EPA ORD recently received feedback on the outline from EPA OW and Regions, and revisions were suggested for 4 of these documents; Science Syntheses #8-11. The suggested revisions expand the scope and desired level of detail in these documents. Under this new Task, the Contractor shall, in consultation with the COR, develop revised outlines for Science Syntheses #8-11. The revised outlines shall broaden the scope to include additional adaptation case studies, methods and frameworks for characterizing and working with uncertainty, and available tools and scenario datasets to support impacts and vulnerability assessments for water infrastructure and ambient water quality (i.e., watersheds). Upon approval of the outline by the COR, the Contractor shall conduct additional analyses and literature reviews as required, and complete the written draft and final versions of Science Syntheses #8-11 as described in the revised outline.

Deliverable M-1.A: Revised outlines for Science Synthesis #8-11. Due to the COR for approval as specified in WA 2-15, Deliverable 2.A.

Deliverable M-1.B: First drafts of Science Syntheses documents #8-11 incorporating changes described in Deliverable M-1.A. Due to the COR as specified in WA 2-15, Deliverable 2.A.

Deliverable M-1.C: Final drafts of Science Syntheses documents #8-11 incorporating changes described in Deliverable M-1.A. Due to the COR as specified in WA 2-15, Deliverable 2.A.

Task M-2. Support EPA ORD to solicit feedback, query, and document feedback from EPA OW and Regions concerning the structure and content of 14 “Program Link” documents

Under WA 2-15, Task 3 (existing), the Contractor shall provide technical writing support EPA ORD to write 14 “Program Link” documents that link or bridge EPA program needs to the relevant science information. It is important that the structure and content of Program Links documents be developed with input and feedback from EPA OW and the Regions to ensure they faithfully capture OW and Regional needs for information.

Under Task M-1, the Contractor shall provide additional support to EPA ORD, as requested by the COR, to solicit feedback, query, and document feedback from EPA OW and Regions concerning the structure and content of the 14 Program Link documents. The support provided under this Task is complementary to but does not duplicate the written deliverables in the existing Task 3 (WA 2-15). Support may include scheduling and attending one or more technical meetings with ORD, OW, and EPA Regional staff addressing each the 14 Program Link topics; developing presentation materials for meetings and documenting meeting outcomes; and developing web based or other methods for soliciting and

querying EPA staff from ORD, OW, and Regional staff about the most useful structure and content of Program Link documents.

Deliverable M-2.A: Support to EPA ORD, as requested by the COR, to solicit feedback, query, and document feedback from EPA OW and Regions concerning the structure and content of the 14 Program Link documents. Due as requested agreed upon with the COR, award through Sept. 28, 2015.

EPA United States Environmental Protection Agency Washington, DC 20460 Work Assignment		Work Assignment Number 2-17	
Contract Number EP-C-12-060		Contract Period 09/30/2012 To 09/29/2015 Base Option Period Number 2	
Contractor TETRA TECH, INC.		Title of Work Assignment/SF Site Name Modeling Hydrology/Water Quali	
Purpose: <input checked="" type="checkbox"/> Work Assignment <input type="checkbox"/> Work Assignment Close-Out <input type="checkbox"/> Work Assignment Amendment <input type="checkbox"/> Incremental Funding <input type="checkbox"/> Work Plan Approval		Specify Section and paragraph of Contract SOW 2c	
		Period of Performance From 09/30/2014 To 09/29/2015	
Comments:			
<input type="checkbox"/> Superfund		Accounting and Appropriations Data	
		<input checked="" type="checkbox"/> Non-Superfund	
Note: To report additional accounting and appropriations data use EPA Form 1900-69A.			
SFO (Max 2) <input type="checkbox"/>			
Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)
			Budget Org/Code (Max 7)
			Program Element (Max 9)
			Object Class (Max 4)
			Amount (Dollars)
			(Cents)
			Site/Project (Max 8)
			Cost Org/Code (Max 7)
1			
2			
3			
4			
5			
Authorized Work Assignment Ceiling			
Contract Period: 09/30/2012 To 09/29/2015		Cost/Fee: LOE:	
This Action:			
Total:			
Work Plan / Cost Estimate Approvals			
Contractor WP Dated:		Cost/Fee: LOE:	
Cumulative Approved:		Cost/Fee: LOE:	
Work Assignment Manager Name Tim Canfield		Branch/Mail Code:	
_____ (Signature)		Phone Number 580-436-8535	
_____ (Date)		FAX Number:	
Project Officer Name Sharon Boyde		Branch/Mail Code:	
_____ (Signature)		Phone Number: 703-347-8576	
_____ (Date)		FAX Number: 703-374-8696	
Other Agency Official Name:		Branch/Mail Code:	
_____ (Signature)		Phone Number:	
_____ (Date)		FAX Number:	
Contracting Official Name Mark Cranley		Branch/Mail Code: CP0D	
_____ (Signature)		Phone Number: 513-487-2351	
_____ (Date)		FAX Number: 513-487-2109	

PERFORMANCE WORK STATEMENT
CONTRACT NUMBER: EP-C-12-060
WORK ASSIGNMENT NUMBER 2-17

ITILE: Modeling hydrology and water quality in predominant agricultural regions with emphasis on the Big Spring Run watershed in Lancaster, PA.

WORK ASSIGNMENT MANAGER (WAM)

Timothy J. Canfield
R.S. Kerr Environmental Research Center
919 Kerr Research Drive
Ada, OK 74820
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PERIOD OF PERFORMANCE: September 30,2014 through September 29, 2015

LEVEL OF EFFORT: 642 hours

INTRODUCTION & BACKGROUND

The Conestoga watershed contributes a significant amount of water and sediment annually to the Chesapeake Bay, a water body that has been listed as impaired under the Clean Water Act since 1998. The water quality concerns for the Chesapeake Bay has attracted federal, state, environmentalists, academics and others to the area to employ their expertise for developing and evaluating mitigation strategies for improving and sustaining the improvement of water quality in the Bay. The work is scattered throughout the watershed and involves everything from management, vegetative, and structural Best Management Practices (BMPs). One research project geared at evaluating a stream restoration effort that employs both the vegetative and structural aspect for reducing stream sediment loss and improving water quality within the Conestoga watershed has gotten national attention because it involves a comprehensive approach to evaluating stream restoration. The study sites includes Big Spring Run (BSR) in Lancaster, PA, which is being evaluated for the effect of the BMP on ground water and surface water quality and quantity, nutrient transport and speciation, biological impacts, physical and mechanistic dynamics of the systems.

The State of Pennsylvania through its commitment to the Chesapeake Bay council set milestones in 2012 to reduce nitrogen, phosphorus and sediment loads to the Chesapeake Bay by approximately; 6.3 million, 0.2 million, and 204 million pounds respectively in the year 2013 (PDEP, 2012). The research at BSR was initiated for conducting pre and post BMP implementation or (stream restoration) evaluations including hydrology, ecological functions, and nutrient dynamics. The site was the location of an historic milldam. Milldams were used between 1600s and 1900s for power generation and occurred in the highest densities along eastern streams within the states of Maryland, Pennsylvania, New York and central New

England and are believed to have resulted in the settlement of fine sediment over resettlement wetlands (Walter and Merritts, 2008). These legacy sediments are highly erodible and can cause between 50 to 80 percent of suspended sediment loads in watersheds in Pennsylvania and Maryland (Walter et al., 2007). The work being conducted at BSR will hopefully give needed information on the effectiveness of the BMP for improving water quality and reducing sediment loads. Work done at BSR will contribute significantly our understanding of the efficacy of structural BMPs. The capability for modeling the study conceptually and showing how restoration could impact sediment delivery and hydrology at a watershed scale could provide useful information for conservation practitioners and others.

Modeling watersheds as an approach for evaluating the impact of BMP implementation has become increasingly relevant due limitations for conducting long-term extensive monitoring. Watershed scale models have been applied to evaluate various aspects of non-point source pollution and to a lesser extent impacts of structural BMPs. Field evaluation of structural BMPs at this scale can be extremely costly. Though watershed models cannot account for every detail, they are a good source for evaluating the targeted systems at work and the dynamics between and within those systems.

The Soil and Water Assessment Tool (SWAT) was developed by the United States Department of Agriculture (USDA), the Agricultural Research Service (ARS) for conducting long-term, continuous, watershed level simulations used for predicting the impact of land management practices on water quality and quantity for variety of soils, land cover and management practices (Arnold et al., 1998). SWAT is a physically based model with the capability for efficiently simulating high levels of spatial detail and requires input of weather, hydrology, soil properties, vegetation, and land management practices (Jha, et al., 2007). SWAT has been tested extensively across the US and internationally for evaluating non-point source pollution, conservation practices, and land use management among others. The model has also been used for watershed studies within the Chesapeake Bay area (Chu et al., 2004; Meng et al., 2010; Sexton et al., 2010; Veith et al., 2010) for evaluating water quality and quantity concerns, and is part the Chesapeake Bay Forecast System (CBFS) being developed by the University Of Maryland at College Park and the National Oceanic and Atmospheric Administration (NOAA) to provide real time simulations of the Bay (Meng et al., 2010).

Hydrology in SWAT is based on a water balance that includes surface runoff, precipitation, percolation, lateral subsurface flow, groundwater return flow, evapotranspiration, and channel transmission loss subroutines. Surface runoff is estimated based on land use, antecedent moisture conditions and soil type using the SCS curve number method (Neitsch, et al., 2011); another option is using the Green-Ampt (Green and Ampt, 1991) for estimating surface runoff and infiltration, however this method requires sub daily weather data.

SWAT transports sediment through a land component and a channel component (Neitsch, et al., 2011). Within the land component the model estimates soil erosion and sediment from hill slope erosion using the Modified Universal Soil Loss Equation (MUSLE) (Williams, 1975; Williams and Berndt, 1977) and transport sediments based on particle size distributions and routes them through surface water sources and channels (Neitsch et al., 2011). Channel sediment routing includes within stream depositional and degradation processes that are dependent on stream

power, channel surface exposure and channel bank and bed composition (Neitsch et al., 2011); that are determined using the modification of Bagnold's sediment transport equation (Bagnold, 1977) and Stokes's law (Chow et al., 1988) to estimates transport concentration capacity as a function of flow velocity.

PROJECT OBJECTIVES

For this WA, the contractor shall provide GIS and modeling support for developing ground water models as part of a project on Big Spring Run in Lancaster County Pennsylvania. This effort will be used to evaluate hydrology and produce ground water flow models useful in describing the effects of restoration at multiple spatial scales.

Ground water and surface water hydrology are critical components of an ecosystem's services and functions, and the fate and transport of environmental stressors through these hydrologic pathways are of vital importance to scientists, regulatory bodies and policy makers. Accordingly, there is an increasing need for all-inclusive studies that capture multiple aspects of ecological problems; for example flow patterns and stressor pathways. The quantity and quality of data needed to characterize all aspects of transport pathways for a specific stressor is time and cost prohibitive. The main objective of this study is to apply and test SWAT for estimating the changes in sediment loads and discharge for post-restoration scenario in the BSR watershed. The objectives of this proposed research are: (a) to parameterize and calibrate ground water and surface water hydrology models for describing the fate and transport of targeted aquatic stressors, especially nitrogen, at varying spatial scales and (b) the calibrated model(s) will then be used to predict the effect of legacy sediment removal on hydrology at BSR and the subsequent effect on nitrogen flux in the BSR watershed.

TASK DESCRIPTION OBJECTIVES

- To evaluate existing data and information form previous contract support to determine where the current progress of the projects stands in relation to the subsequent tasks listed below.
- GIS support for the creation, manipulation or calculations involving the use of GIS data sources such as LIDAR data, land use data, soil, and other spatially referenced data as needed
- Programming support for modeling efforts that may include, changes in spatial scales, model modifications, and post processing executions
- Parameterize SWAT for BSR watershed and then apply model for simulating the effects of legacy sediment - stream restoration efforts within the watershed. Model application should meet QA standards (G-17184)
- Provide a comprehensive written final report of modeling results and GIS developed from the project data to be delivered to EPA WAM and Task Lead.

QUALITY ASSURANCE

This work will be done in accordance with a Quality Assurance Project Plan (QAPP) submitted by the contractor and approved by the EPA in response to this work assignment. The QAPP will include requirements for data quality. A copy of GWERD QAPP will be provided to the contractor as reference material for the development of the contractor QAPP.

TASK 1: Prepare work plan, cost estimate, quality assurance project plan, & biweekly reports

Sub-Task 1.1 – Prepare work plan, cost estimate & biweekly report schedule

The contractor shall prepare and submit a work plan and a cost estimate in response to this work assignment. This work effort will require expertise in GIS, modeling proficiency using SWAT, HEC-RAS, MODFLOW, and APEX, and familiarity with EndNote, Microsoft Access, Microsoft Excel. The ability to analyze existing data in addition to searching, understanding, and effectively formulating scientific literature are necessary for this work effort.. The contractor should examine the proposed timeline for this Work Effort (Attachment 1) when developing the work plan. The contractor also shall prepare and provide bi-weekly updates as necessary (typically no more than 1 page detailing progress on work assignment tasks. A current copy of the EndNote Data Base will be provided to the EPA WAM and Task Lead at the time of the first bi-weekly update where the file is created and then subsequently when requested by the PI. These reports will be presented at the biweekly update calls that will be scheduled for the duration of this project. Prior to the call a brief communication will be had between the EPA WAM and Task Lead and the contractor lead person to determine if the update call is necessary. If it is determined that no call is necessary then a subsequent call will be scheduled for the following week. No more than three weeks should pass before an update meeting is conducted. Typical call lengths will be 30-60 minutes.

Sub-Task 1.2 –Prepare Quality Assurance Project Plan (QAPP prepared for WA-1-17 is still valid and can (and should) be used for the work going forward in WA-2-17). A New QAPP for WA-2-17 is not required.

The contractor shall prepare a Quality Assurance Project Plan (QAPP) in response to this work assignment within 15 calendar days of receiving this SOW. The contractor QAPP shall address the modeling approach selected to complete the task based on the EPA QAPP provided by the EPA WAM and Task Lead to be used as a point of reference for development of the contractor QAPP. The contractor QAPP should include requirements for independent entry and reconciliation of information collected from 10% of the papers reviewed and data sources utilized to provide accuracy of data input is documented. The QAPP shall be written in accordance with U.S. EPA standards and the NRMRL QMP

requirements for Research Model Development and Application Projects. (Requirements will be provided). Contractor will provide a copy of the QAPP to the WAM and Task Lead in electronic form, when the WP and cost estimate are submitted. The QAPP will be reviewed by the EPA Task Lead, EPA WAM, and QA Manager with final approval by the EPA Task Lead, the Task Lead's supervisor, and the EPA QA Manager. The contractor shall respond to the review comments with a revised QAPP. Work shall not commence until the QAPP is approved by the EPA.

TASK 2: Review existing data and information provided by EPA to determine current state of the project effort. (This effort will be continuing in WA 2-17. All elements should be the same as contained in WA 1-17 as this work is still current.)

Kick-off Conference Call

The contractor and EPA WAM, Task Lead, and an EPA modeler will engage in an initial phone call to discuss and clarify the tasks of the SOW. A discussion of each task will be had and any initial questions that the contractor may have will be addressed. This WA shall utilize work conducted by a previous contractor. Discussion regarding the current state of the information that was provided by a previous contractor will be conducted. Questions regarding the development of the Endnote database will be discussed. The list of deliverables will be discussed and any questions or initial modifications to delivery schedule of these deliverables will be discussed and agreed upon. Finally a discussion of the communication of milestones and deliverables (both written (word document) and via conference call) will be discussed and a final schedule will be developed and agreed upon.

Communication: The contractor shall provide written (word document) and oral reports (via conference call) to the EPA Task Lead(TL), EPA WAM, and Contractor WAM, on all communication regarding the project progression and any items deemed pertinent with the progression of developing the Endnote files, the model usage and development, status of existing data provided by EPA and the Summary Report.

Deliverables: The contractor shall produce deliverables according to the agreed upon time line as appropriate. The EPA will review these deliverables in a timely manner to provide feedback as appropriate to the contractor in collaboration with the EPA WAM.

TASK 3 – GIS support for the creation, manipulation or calculations involving the use of GIS data sources such as LIDAR data, land use data, soil and other spatially references data as needed. (This effort will be continuing in WA 2-17. All elements should be the same as contained in WA 1-17 as this work is still current.)

The Contractor shall review the GIS data and the work previously accomplished by the previous contract effort to determine what exists for GIS data and spatially referenced maps. The contractor will start the review of relevant literature provided by the EPA to become familiar with literature that is pertinent to the project study site. As additional literature is found by the contractor it will be incorporated into the Project Endnote file with an attached PDF copy of the project attached to the reference.

TASK 4 – Programming support for modeling efforts that may include changes in spatial scales, model modifications and post processing executions. (This effort will be continuing in WA 2-17. All elements should be the same as contained in WA 1-17 as this work is still current.)

The Contractor shall start the process of becoming familiar with the models that will be used for this effort. Existing data will be evaluated to determine if sufficient data is available to start modeling of the Big Spring Watershed

TASK 5: Parameterize SWAT for the Big Spring Run watershed and then apply the model for simulating the effects of legacy sediment – stream restoration efforts within the watershed. Model Application should meet QA standards in the contractor QAPP and in the EPA reference QAPP. (This effort will be continuing in WA 2-17. All elements should be the same as contained in WA 1-17 as this work is still current.)

The contractor shall utilize to the extent possible the existing data provided by EPA to develop these model runs. If additional data is needed then contractor will look to incorporate such data as needed. As part of this effort the contractor will be required to develop: 1: A preliminary calibration and validation of the model results; 2: A sensitivity analysis of the model; 3: and an application of the model for simulating potential restoration effects first in the Big Spring Run watershed and second in other similar watersheds with legacy sediments. This effort will involve programming within the ArcGIS environment for exacting changes to LIDAR for representing post restoration changes. Detailed documentation of all aspects of modeling work should be kept and submitted with all electronic files at the completion of the work. Files of all tables and graphs will be supplied to the EPA Task Lead and EPA WAM in the original format that they were developed as well as in the summary report.

TASK 6: Summary of findings from the SWAT model runs regarding the effects of the restoration on the hydrology of Big Spring Run in Lancaster County PA. (This effort will be continuing in WA 2-17. All elements should be the same as contained in WA 1-17 as this work is still current.)

The contractor shall provide a written summary of the results of the SWAT modeling for the Big Spring Run watershed. Data tables with the pertinent information for these watersheds will be developed and presented in the summary report. Files of all tables and graphs will be supplied to the EPA Task Lead and EPA WAM in the original format that they were developed as well as in the summary report.

Attachment 1: Proposed timeline for this Work Effort (Revised)

TASK	SUB-TASK	MILESTONE	TIMELINE
1	1.1	Prepare work plan, cost estimate & biweekly report schedule	Reviewed (and revised if necessary) work plan by October 7, 2014.
1	1.2	Prepare Quality Assurance Project Plan	Current QAPP for WA 1-17 can and should be used for WA 2-17. No changes needed. October 7, 2014
2		Kick-off Conference Call. Review existing data and information provided by EPA to determine current state of the project effort	By October 9, 2014
3		GIS support for the creation, manipulation or calculations involving the use of GIS data sources such as LIDAR data, land use data, soil and other spatially references data as needed	By November 4, 2014.
4		Programming support for modeling efforts that may include changes in spatial scales, model modifications and post processing executions.	By November 4, 2014
5		Parameterize SWAT for the Big Spring Run watershed and then apply the model for simulating the effects of legacy sediment – stream restoration efforts within the watershed. Model Application should meet QA standards in the contractor QAPP and in the EPA reference QAPP.	By December 2, 2014
6		A comprehensive written report with respect to findings from the SWAT model runs identifying the effects of the restoration on the hydrology of Big Spring Run	By February 5, 2015

References

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- Chow, V. T., Maidment, D. R., & Mays, L. W. (1988). Applied hydrology. McGraw-Hill, New York, New York.
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- Sexton, A. M., Sadeghi, A. M., Zhang, X., Srinivasan, R., & Shirmohammadi, A. (2010). Using NEXRAD and Rain Gauge Precipitation Data for Hydrologic Calibration of SWAT in a Northeastern Watershed. Transactions of ASBAE, 53(5), 1501-1510
- Veith, T. L., Van Liew, M. W., Bosch, D. D., & Arnold, J. G. (2010). Parameter sensitivity and uncertainty in SWAT: A comparison across five USDA-ARS watersheds. Transactions of the ASABE, 53(5), 1477-1485.
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- Williams, J. R. (1975). SEDIMENT ROUTING FOR AGRICULTURAL WATERSHEDS1. JAWRA Journal of the American Water Resources Association, 11(5), 965-974.
- Williams, J. R., & Berndt, H. D. (1977). Sediment yield prediction based on watershed hydrology. Transactions of the American Society of Agricultural Engineers, 20(6).

EPAUnited States Environmental Protection Agency
Washington, DC 20460**Work Assignment**

Work Assignment Number

2-17

☐ Other ☐ Amendment Number:

Contract Number

EP-C-12-060

Contract Period 09/30/2012 To 09/29/2015

Base

Option Period Number 2

Title of Work Assignment/SF Site Name

Modeling Hydrology

Contractor

TETRA TECH, INC.

Specify Section and paragraph of Contract SOW

Purpose:



Work Assignment



Work Assignment Close-Out



Work Assignment Amendment



Incremental Funding



Work Plan Approval

Period of Performance

From 09/30/2014 To 09/29/2015

Comments:



Superfund

Accounting and Appropriations Data



Non-Superfund

SFO

(Max 2)



Note: To report additional accounting and appropriations data use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period:

09/30/2012 To 09/29/2015

Cost/Fee: \$0.00

LOE: 0

This Action:

\$64,182.00

642

Total:

\$64,182.00

642

Work Plan / Cost Estimate Approvals

Contractor WP Dated: 10/15/2014

Cost/Fee: \$64,182.00

LOE: 642

Cumulative Approved:

Cost/Fee: \$64,182.00

LOE: 642

Work Assignment Manager Name Tim Canfield

Branch/Mail Code:

Phone Number 580-436-8535

FAX Number:

(Signature)

(Date)

Project Officer Name Sharon Boyde

Branch/Mail Code:

Phone Number: 703-347-8576

FAX Number: 703-374-8696

(Signature)

(Date)

Other Agency Official Name

Branch/Mail Code:

Phone Number:

FAX Number:

(Signature)

(Date)

Contracting Official Name Mark Cranley

Branch/Mail Code: CP00

Phone Number: 513-487-2351

FAX Number: 513-487-2109

(Signature)

(Date)

EPA United States Environmental Protection Agency Washington, DC 20460 Work Assignment		Work Assignment Number 2-19								
		<input type="checkbox"/> Other <input type="checkbox"/> Amendment Number:								
Contract Number EP-C-12-060		Contract Period 09/30/2012 To 09/29/2015 Title of Work Assignment/SF Site Name Criterion Research								
Contractor TETRA TECH, INC.		Base Option Period Number 2 Specify Section and paragraph of Contract SOW 2a								
Purpose: <input checked="" type="checkbox"/> Work Assignment <input type="checkbox"/> Work Assignment Close-Out <input type="checkbox"/> Work Assignment Amendment <input type="checkbox"/> Incremental Funding <input type="checkbox"/> Work Plan Approval		Period of Performance From 09/30/2014 To 09/29/2015								
Comments:										
<input type="checkbox"/> Superfund Accounting and Appropriations Data <input checked="" type="checkbox"/> Non-Superfund										
Note: To report additional accounting and appropriations data use EPA Form 1900-69A.										
SFO (Max 2) <input type="checkbox"/>										
Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										
Authorized Work Assignment Ceiling										
Contract Period:		Cost/Fee:		LOE:						
09/30/2012 To 09/29/2015										
This Action:										
Total:										
Work Plan / Cost Estimate Approvals										
Contractor WP Dated:		Cost/Fee:		LOE:						
Cumulative Approved:		Cost/Fee:		LOE:						
Work Assignment Manager Name Susan Cormier <div style="display: flex; justify-content: space-between;"> <div>_____ (Signature)</div> <div>_____ (Date)</div> </div>								Branch/Mail Code: Phone Number 513-569-7995 FAX Number:		
Project Officer Name Sharon Boyde <div style="display: flex; justify-content: space-between;"> <div>_____ (Signature)</div> <div>_____ (Date)</div> </div>								Branch/Mail Code: Phone Number: 703-347-8576 FAX Number: 703-374-8696		
Other Agency Official Name <div style="display: flex; justify-content: space-between;"> <div>_____ (Signature)</div> <div>_____ (Date)</div> </div>								Branch/Mail Code: Phone Number: FAX Number:		
Contracting Official Name Mark Cranley <div style="display: flex; justify-content: space-between;"> <div> (Signature) </div> <div>11/18/14 (Date)</div> </div>								Branch/Mail Code: CP0D Phone Number: 513-487-2351 FAX Number: 513-487-2109		

PERFORMANCE WORK STATEMENT

Tetra Tech, Inc.
Contract EP-C-12-060
Work Assignment 2-19

TITLE: Support for Field-based Criterion Research

PERIOD OF PERFORMANCE: Award date through September 29, 2015

WORK ASSIGNMENT MANAGER (WAM):

Susan Cormier, Ph.D.
U.S. Environmental Protection Agency
Office of Research and Development
National Center for Environmental Assessment
26 W. M. L. King Drive
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513-569-7034 (voice)
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ALTERNATE WAM:

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BACKGROUND:

The US Environmental Protection Agency's (EPA) Office of Research and Development (ORD), National Center for Environmental Assessment-Cincinnati (NCEA) provides guidance about how pollutants may impact our health and the environment. This is an important piece in the risk assessment process between the ORD bench scientist and EPA's program and regional office managers who are making regulatory, enforcement, and remedial-action decisions.

EPA's Office of Water (OW) and Office of Research and Development have completed the development of a draft national field-based method to develop CWA 304(a) aquatic life criteria for conductivity, a measure of ionic concentration. An external peer review has been initiated. CWA Section 304(a) water quality criteria provide information to States and authorized Tribes in adopting water quality standards for protecting aquatic life and human health. The draft national field-based method and case studies are based on the latest scientific knowledge on the aquatic toxicity of an ionic mixture dominated by sulfate, bicarbonate, calcium, and

magnesium ions, as measured by specific conductivity. EPA is committed to developing information that is useful to state and tribal water quality managers in implementing the national methodology for conductivity. To fulfill this mission, NCEA requires the expertise and support as described in the contract Performance Work Statement (PWS). Under this work assignment, support is needed specifically for revising the document per peer review comments, which may include additional analyses or modifications to additional analyses and minor re-formatting and editing of the draft methodology document prior to public comment and again to respond to public comments. This work assignment is intended to serve as a general technical support work assignment, for the draft conductivity criteria document after peer review.

OBJECTIVES

The first objective of the work assignment is to provide greater transparency to the analyses used to produce the draft conductivity criterion method and to make it easier to use the field-based method for developing criteria. The success of this effort will be based on the ability of EPA personnel and others to understand and repeat the analyses using the open source program R and Microsoft as described in Task 3. The second objective is to support the peer review process by organizing the external and public comments in a convenient fashion so the EPA can efficiently respond to substantive comments in a timely way, see Task 4, and to provide support in developing EPA's Response to Public and Peer Review comment documents. Success of this task will be based on the number of comments that are misclassified or the number of time EPA personnel need to recategorize or split comments into more manageable and organized units.

QUALITY ASSURANCE

The tasks in this work assignment require the use of secondary data. The contractor shall use the QAPP submitted for WA 1-189 (Support for Conductivity Benchmark Efforts) as updated in July 2014. All QA activities shall be in conformance with EPA's Requirements for Quality Assurance Project Plans (EPA QA/R-5) "<http://www.epa.gov/quality/qs-docs/r5-final.pdf>" and should demonstrate a clear understanding of the project's goals/objectives/questions and issues. Documentation of all analyses shall also indicate how types, quantity, quality of data have been quality assured and maintained. In particular, the quality assurance report shall also ensure that metadata is compiled in an easy to use format. All products should be detailed so that the decisions and analysis are completely transparent to a third party. The contractor shall alert the COR regarding any quality issues should they arise.

Consistent with the Agency's Quality Assurance (QA) requirements, the Quality Assurance Project Plan (QAPP), included as the July 2008 Attachment A and B (titled respectively, "Programmatic Quality Assurance Project Plan for the Use of Secondary Data" and "QAPP Supplemental Requirements for Projects Using Secondary Data") to the QMP, which have been provided by the contractor, will assure the quality of the work performed under this work assignment. The project specific quality assurance requirements must be addressed in the work plan and monthly progress reports as specified under Task 1. The QA activities should comprise no more than 10% of the total effort.

SCOPE OF WORK

The purpose of this work assignment is to obtain contractor services to address new or modified analyses suggested by peer review comments, perform minor formatting and editing of the draft conductivity criteria document, and respond to public comments. The specific tasks are defined below. Technical direction will be provided to the contractor for clarification purposes through written communication provided by the EPA WAM using technical direction memoranda. Additional background and more details regarding the PWS are provided under the individual task descriptions. Any technical direction (verbal or written) shall be provided to the PO/CO within 3 days.

Task 1: Prepare Work Plan, Monthly Progress Reports, and Comply with EPA Information Quality Guidelines

The contractor shall:

- a) Develop a work plan to address all tasks in this work assignment. The work plan must include a schedule, staffing plan, level of effort (LOE), cost estimate, the contractor's key assumptions on which staffing plan and budget are based, and qualifications of proposed staff. If a subcontractor(s) is proposed, the contractor must include information on plans to manage work and contract costs. All P levels, hours and totals shall be provided and costs greater than \$100.00 must be itemized in detail. The contractor must provide the job number with all invoices to facilitate their expediency.

Work plan

Within 15 business days after receipt of work assignment

- b) Provide monthly progress and financial reports. The monthly progress report shall indicate, in a separate QA section, whether significant QA issues have been identified and how they are being resolved. Monthly financial reports must include a table with the invoice LOE and costs broken out by the tasks in this WA.

Monthly Progress and Financial Reports

Monthly

- c) Ensure the products developed under this work assignment comply with the EPA Information Quality Guidelines and shall complete the Checklist for Influential Information as needed for each deliverable from this work assignment as they may be used in Agency decision-making and/or will be publicly available documents. The contractor shall provide a memorandum describing how the planned product(s) developed meet EPA's Information Quality Guidelines checklist. As part of that memo, the contractor shall document the quality assurance procedures it used in developing the deliverables under this Work Assignment. If requested by the WAM, the contractor shall provide the memo at the time it delivers the final revisions (Task 3b). As directed by the WAM, the contractor shall meet with the WAM (through teleconference) to discuss the Guidelines and the contractor's role in completing the checklist.

Checklist for Influential Information

Within 10 business days after call with WAM (if requested)

- d) Provide complete metadata for all manipulations of datasets, documentation of all figures, tables, and analyses performed in conjunction with the development of the public release of the draft conductivity criterion method including all appendices, and supporting analyses such as validation of fish assessment and temperature assessment. Datasets and corresponding data dictionaries used for all the analyses shall be provided as flat files (e.g., tab, or comma-delimited) as well as a data dictionary. Files shall be sorted into logical folders such as R-codes, excel work sheets, data sets, figures, tables, text and linked to a table of contents. The open source R-code should be split into separate preprocessing and analytic functions.

The contractor shall use the open source software "R" for statistical analyses unless otherwise specified with concurrence from the COR. Annotated code and data sets should be retained and submitted when providing results. Results and figures should be provided as code for the statistical package language that was used and in ppt, pdf, eps or other image software approved by the COR. Formulae for fitted lines should be provided.

Any spatial analysis, that is, the use of Geographic Information System (GIS) tools, functions, geoprocessing, and operations (e.g. map overlay, spatial query) of geographically-referenced data, shall include either a flow chart or model-builder steps that depict the data management and analysis of the GIS layers. If any scripts are used in the GIS analysis, those scripts should be annotated, retained, and submitted when providing results. Any maps produced from a GIS system shall include the source information of the data shown in the map and map projection, which may be in Adobe PDF files or ESRI format as dictated by technical direction. FGDC-compliant metadata will be developed for any newly developed GIS datasets for use with this tool.

After the construction of the metadata pedigree, the contractor shall test the final product by having non-development personnel rerun all scripts.

Metadata of analyses

Within 30 business days after completion of analyses

Task 2: Complete Technical Analyses Suggested by the Peer Reviewers or Anticipated by EPA

The contractor shall:

- a) Participate in a conference call with WAM to clarify analyses necessary and work schedules for analyses.

Conference Call

Within 5 business days after receipt technical directive.

- b) Perform technical tasks which may include additional analyses or modifications of existing analyses per peer review comments and WAM direction.

Completed Analyses

Within 25 business days after receipt of state data sets.

- c) Prepare a final report for the national nomograph

Completed Analyses

Within 45 business days after completion of analyses

Task 3: Response to External Peer Review Editing and Potential Re-formatting of the Draft Document

- a) After the external peer review is complete, the EPA will provide comments received to contractor within 5 days. The contractor shall schedule a conference call or meeting to discuss the peer review comments, response to comments, and potential revisions to the document.

Conference Call

Within 3 business days of receiving comments

- b) The contractor shall assist EPA with drafting response to peer review comments. Using the final peer review report, which will be organized into a table by peer review question and reviewer response, the contractor shall color code or otherwise flag the comments so that it is easy to see those not requiring a response, those questions the contractor has provided a draft response, and those questions requiring EPA attention. EPA will review all draft responses provided by the Contractor and make edits to the documents based on the review prior to finalizing the document for formatting.

Draft response to comments

Within 25 working days of conference call

- c) The contractor shall incorporate any final changes necessary per technical comments received during the peer review as identified by EPA in Task 3b and finalize the Response to Peer Review Comments document. The contractor shall provide minor revisions necessary of all figures/text/tables (including final QA) and formatting of the complete criterion method document as necessary for publishing for public review. The contractor shall provide the final revised document to the WAM for review and approval 10 business days after the conference call. Deliverables meant for public comment will be Section 508 Compliant.

Final public comment draft

Due 10 business days after conference call with WAM

Task 4. Response to Public Comments

- a) After the public comment period is closed, the EPA will provide comments received to contractor within 5 days. The contractor shall schedule a conference call or meeting to discuss the public comments, response to comments, and potential revisions to the document.

Conference Call

Within 3 business days of receiving comments

- b) The contractor shall assist EPA with drafting response to public comments. The Contractor shall prepare an excel spreadsheet organizing the sheets based on public comment question and reviewer. The contractor shall color code or otherwise flag the comments so that it is easy to see those not requiring a response, those questions the contractor has provided a draft response, and those questions requiring EPA attention. EPA will review all draft responses provided by the Contractor and make edits to the documents based on the review prior to finalizing the document for formatting.

Draft response to public comments

Within 25 working days of conference call

- c) The contractor shall incorporate any final changes necessary per technical comments received during public comment as identified by EPA in 4b and finalize the document. Provide revisions necessary of all figures/text/tables (including final QA) and formatting of the complete criterion methodology document as necessary for publishing for public review. Deliverables meant for public release will be Section 508 Compliant.

Final criterion document

Within 10 working days receipt of WAM comments on draft

Technical Expertise Required for Key Contractor Staff:

The key technical individual(s) must have experience with aquatic life criteria document development, may require biostatistics (particularly R and writing and reviewing code), water chemistry as it relates to ionic concentration and effects on aquatic life, and the relevant body of literature.

Deliverables and Schedule

Task 1a	Prepare Workplan	Within 15 calendar days after receipt of work assignment
Task 1b	Monthly Progress and Financial reports	Monthly as described
Task 1c	Checklist for Influential Information and memorandum on quality assurance procedures	Within 10 business days after call with WAM (if requested)
Task 1d	Provide complete metadata of all analyses	Within 30 days of completion of analyses
Task 2a	Conference call with WAM	Within 5 business days of receipt of approved workplan

Task 2b	Technical analyses	Due 25 business days after conference call with WAM
Task 2c	Final report on national nomograph of background conductivity and estimated criteria	Within 45 business days after receipt of state data sets.
Task 3a	External Peer Review Conference call with WAM	Within 3 business days of receipt of public peer review comments
Task 3b	Draft response to external peer review comments	Within 25 business day of conference call
Task 3c	Minor review and potential re-formatting of the document prior to public comment	Due 10 business days after conference call with WAM
Task 4a	Public Comment Conference call with WAM	Within 3 business days of receiving comments
Task 4b	Draft response to public comments	Within 25 business day of conference call
Task 4c	Minor review and potential re-formatting of the criterion document per technical public comment	Within 10 working days receipt of WAM comments on draft

ACCEPTANCE CRITERIA

The Contractor shall prepare high quality products and that are reproducible and transparent. Figures submitted shall be of high quality similar to presentations developed for national scientific forums and should be formatted as jpeg or png files. Text deliverables shall be provided in Microsoft Word 2007 or compatible format.

TRAVEL

No travel is anticipated for this work assignment.

SPECIAL REPORTING REQUIREMENTS

Following Work Assignment approval, the Contractor WAM shall maintain communication with the EPA WAM on a biweekly basis through email, telephone, or in writing. The contractor shall contact the work assignment manager by phone with any questions or problems as soon as they arise to ensure rapid resolution. Any technical direction must be documented and a copy sent to the Contracting Officer.

Written monthly progress reports must be detailed, split into specific tasks to support billings, and document any/all QA/QC procedures performed during the reporting period.

The contractor shall provide the EPA WAM, either electronically (pdf format) or by fax, any/all documents submitted as deliverables.

Copies of the final report will be submitted in electronic form, with electronic word processing, spreadsheet, statistical and graphics files submitted in software format designated by the EPA WAM.

CONFLICT OF INTEREST

The Contractor warrants that, to the best of the Contractor's knowledge and belief, that there are no relevant facts or circumstances which could give rise to a conflict of interest, as defined in FAR subpart 9.5, or that the Contractor has disclosed all such relevant information.

The Contractor agrees to notify the Contracting Officer immediately, that to the best of its knowledge and belief, no actual or potential conflict of interest exists or to identify to the Contracting Officer any actual or potential conflict of interest the Contractor may have.

The Contractor agrees that if an actual or potential conflict of interest is identified during the performance, the Contractor shall immediately make a full disclosure in writing to the Contracting Officer. This disclosure shall include a description of actions which the Contractor has taken or proposes to take, after consulting with the Contracting Officer, to avoid, mitigate, or neutralize the actual or potential conflict of interest. The Contractor shall continue performance until notified by the Contracting Officer of any contrary action to be taken.

MANAGEMENT CONTROLS

1. The EPA will review and provide comments on the Work Plan and QAPP.
2. The EPA will also review and provide comments on the subsequent module outlines, module drafts, and conceptual models for each of the candidate causes.
3. The Contractor shall clearly identify itself as an EPA contractor when acting in fulfillment of this contract. No decision-making activities relating to Agency policy, enforcement or future contracting shall take place if the Contractor is present. If the Contractor has a need to meet with Federal employees on-site, then the Contractor personnel shall visibly wear identification in performance of this contract while on-site that will be issued by the Government upon arrival to the Federal facility.
4. Technical Direction: The WAM is authorized to provide technical direction that clarifies the statement of work as set forth in this work assignment. Before initiating any action under technical direction, the contractor shall ensure that the technical direction falls within the scope of work for this work assignment. The technical direction shall be issued in writing by the WAM within four working days of verbal issuance. This will be forwarded to the PO and CO for their information and necessary actions.

The WAM/COR is the only person authorized to make changes to this work assignment or contract. The changes must have prior approval from the WAM/COR in writing as an amendment or modification to the work assignment or contract.

Technical direction includes direction to the contractor that assists the contractor in accomplishing individual tasks deemed appropriate under the Statement of Work, as well as comments and approval of reports and other deliverables

NOTICE REGARDING GUIDANCE PROVIDED UNDER THIS WORK ASSIGNMENT

Guidance by the Contractor is strictly limited to management and analytical support. The Contractor shall not engage in activities of an inherently governmental nature such as the following:

1. Formulation of Agency policy
2. Selection of Agency priorities
3. Development of Agency regulations

Should the Contractor receive any instruction from an EPA staff person that the Contractor ascertains to fall into any of these categories or goes beyond the scope of the contractor or work assignment, the Contractor shall immediately contact the Project Officer or the Contract Specialist.

The Contractor shall also ensure that work under this individual work assignment does not contain any apparent or real personal or organizational conflict of interest. The Contractor shall certify that none exists at the time the work plan is submitted to EPA.

<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> <h1 style="margin: 0;">EPA</h1> </div> <div style="text-align: center;"> <p>United States Environmental Protection Agency Washington, DC 20460</p> <h2 style="margin: 0;">Work Assignment</h2> </div> </div>		<p>Work Assignment Number 2-19</p> <p><input type="checkbox"/> Other <input type="checkbox"/> Amendment Number:</p>								
Contract Number EP-C-12-060	Contract Period 09/30/2012 To 09/29/2015 Base Option Period Number 2	Title of Work Assignment/SF Site Name Criterion Research								
Contractor TETRA TECH, INC.		Specify Section and paragraph of Contract SOW 2a								
Purpose: <input checked="" type="checkbox"/> Work Assignment <input type="checkbox"/> Work Assignment Close-Out <input type="checkbox"/> Work Assignment Amendment <input type="checkbox"/> Incremental Funding <input checked="" type="checkbox"/> Work Plan Approval		Period of Performance From 09/30/2014 To 09/29/2015								
Comments: Full Title: Support for Field-Based Criterion Research										
<div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> Superfund <div style="text-align: center;">Accounting and Appropriations Data</div> <input checked="" type="checkbox"/> Non-Superfund </div>										
SFO <input type="checkbox"/> Note: To report additional accounting and appropriations data use EPA Form 1900-69A. (Max 2)										
Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										
Authorized Work Assignment Ceiling										
Contract Period:		Cost/Fee:		\$0.00		LOE:		0		
09/30/2012 To 09/29/2015										
This Action:		Cost/Fee:		\$0.00		LOE:		0		
Total:		Cost/Fee:		\$42,979.00		LOE:		397		
Work Plan / Cost Estimate Approvals										
Contractor WP Dated:		12/03/2014		Cost/Fee:		\$0.00		LOE:		0
Cumulative Approved:				Cost/Fee:		\$42,979.00		LOE:		397
Work Assignment Manager Name		Susan Cormier				Branch/Mail Code:				
						Phone Number 513-569-7995				
						FAX Number:				
Project Officer Name		Sharon Boyde				Branch/Mail Code:				
						Phone Number: 703-347-8576				
						FAX Number: 703-374-8696				
Other Agency Official Name						Branch/Mail Code:				
						Phone Number:				
						FAX Number:				
Contracting Official Name		Mark Cranley				Branch/Mail Code: CP0D				
						Phone Number: 513-487-2351				
						FAX Number: 513-487-2109				